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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/757,392	01/15/2004	You-seop Lee	249/438	4957

27849 7590 07/18/2007

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EXAMINER	
WEINSTEIN, LEONARD J	
ART UNIT	PAPER NUMBER
3746	

MAIL DATE	DELIVERY MODE
07/18/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

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Office Action Summary	Application No.	Applicant(s)	
	10/757,392	LEE ET AL.	
	Examiner	Art Unit	
	Leonard J. Weinstein	3746	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 1 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *27 April 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-19* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-19* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. This office action is in response to the amendment of April 27, 2007. In making the below rejections and/or objections the examiner has considered and addressed each of the applicant's arguments.

2. The examiner acknowledges that claims 1, 3, 7-10, and 12-14 have been amended and claims 17-19 have been added in the amendment of April 27, 2007.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1-2, 6, and 9-15 are rejected under 35 U.S.C. 102(b) as being anticipated by Field et al., 6,062,681. Field teaches all the limitations as claimed for a pump, in the embodiment of figure 3, including: a pumping chamber 130 to be filled with a fluid, at least one fluid entrance 18 and at least one fluid exit 14, which are connected to the pumping chamber 130, a heating element, elements 134 and 135, at one side of the pumping chamber 130 to generate bubbles in the pumping chamber 130 by heating the fluid (col. 9 ll. 52-55), and electrodes 164 for applying current to the heating element, elements 134 and 135, wherein a fluid flow into or out of the pumping chamber 130 is by expansion and contraction of the bubbles (col. 16 ll. 14-25), and a cross-sectional area of a fluid exit 14 varies along a direction of fluid flow, a element 14 is in communication with element 5 via element 4 with element 5 having a triangular cross-section as shown in figure 1A and applied to the embodiment of figure 3; a cross-sectional area of the fluid entrance 18 decreases in a direction toward the pumping

chamber 130, as element 18 is in communication with element 22 and wherein element 22 has a larger cross-section than element 18, and the cross-sectional area of the fluid exit 5 increases in a direction toward the pumping chamber 130, as shown in figure 1A and applied to the embodiment shown in figure 3 the triangular cross section of element 5 increases from a top section to a bottom section in a direction towards element 130; a fluid entrance 18 is provided at one side of the pumping chamber 130 and the fluid exit 14 is provided at an opposite side of the pumping chamber 130 to face the fluid entrance, as shown in figure 1A; a pumping chamber 130 and the heating element, elements 234 and 235, has a rectangular shape as shown in the embodiment of figure 5B; a pumping chamber 30 and the heating element, elements 34 and 35, has a circular shape, as shown in figure 1C; a heating element, elements 134 and 135, is formed of a resistive heating material 53 (col. 13 ll. 6-12); a substrate 45 surrounding portions of the pumping chamber 130, the fluid entrance 18, and the fluid exit 14; an insulation layer 143 between the substrate 45 and the heating element, elements 134 and 135, the insulation layer 143 being in communication with the fluid in the pumping chamber 130; a passivation layer 42 on the heating element, elements 134 and 135, and the electrodes 164; a heat dissipation layer 49 formed on the passivation layer 42 for dissipating heat, wherein the heat dissipation 49 layer is connected to the substrate 45, as shown in figure 1A and applied to the embodiment as shown in figure 3; and a fluid exit 14 includes a surface slanted at an angle, as defined by the walls forming the triangular cross-section of element 5 orientated at an angle less that 90° with reference to the axis along which the bottom of element 130 is disposed, with respect to a bottom surface of the pumping chamber 130.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

7. Claims 3-5 and 7-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Field et al. 6,062,681 in view of Peeters et al. 5,751,317. Field teaches all the limitations of the invention as substantially claimed and as discussed above but fails to teach the following limitations taught by Peeters including: a pumping chamber, front section of taper 46 of element 32 to the end of taper 40 of element 30, a fluid entrance 12 and a fluid exit 16 formed to have an inclination angle of about 50° to about 70° (Peeters col. 4 ll. 32-35); a cross-sectional area of the fluid entrance 12 increases, via taper 46, in a direction toward the pumping chamber, front section of taper 46 of element 32 to the end of taper 40 of element 30, and the cross-sectional area of the fluid exit 16 decreases, via taper 40, in a direction toward the pumping chamber, front section of taper 46 of element 32 to the end of taper 40 of element 30; a fluid entrance 12 and the fluid 16 exit are formed to have an inclination angle of about 30° or less (Peeters col. 4 ll. 29-32); the fluid entrance, 44 of 12, and the fluid exit, 40

of 16, each have a pyramid shape; and a fluid entrance 12 and the fluid exit 16 each have a uniform height and a width, via a "cone angle," that varies in a direction in which the fluid flows (col. 4 ll. 22-29). A combination as discussed teaches the general conditions of the claimed invention except for the express disclosure of one of a fluid entrance and a fluid exit formed to have an inclination angle of about 50° to about 70°. It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide one of a fluid entrance and a fluid exit formed to have an inclination angle of about 50° to about 70°, since the claimed values are merely an optimum or workable range. It has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. In re Aller, 105 USPQ 233. Further it would have been obvious to one having ordinary skill in the art at the time the invention was made to combine the configuration of an entrance and exit of Peeters with the electrodes of Field to provide a thermal in-jet printer in which the fluid flow channel is shaped for impedance control allowing for optimal performance (Peeters col. 1 ll. 5-8).

8. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Field '681. Field teaches all the limitations as substantially claimed for a micro-pump having a heat dissipation layer 49 consisting of a fillet formed from a fluid plastic material but fails to teach a heat dissipation layer formed of metal. It would have been obvious to one having ordinary skill in the art at the time the invention was made to substitute the construction of a bubble valve with each corner of the ink delivery channel filled with a fillet made a metal heat dissipation layer for the fluid plastic material of Field to form a more reliable low-leakage seal. It has been held to be within the general skill of a worker in the art to select a known material on the basis of its

suitability for the intended use as a matter of obvious design choice (see MPEP 2144.07 - Art Recognized Suitability for an Intended Purpose).

9. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Field '681. Field discloses the claimed invention except for heating element provided outside a pumping chamber. It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide a heating element outside a pumping chamber in order to provide a means for removal and replacement of a heating element in the event of component failure. It has been held that rearranging parts of an invention involves only routine skill in the art. In re Japikse, 86 USPQ 70.

10. Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Field '681. Field discloses the claimed invention except for an upper wall of the pumping chamber providing an insulation layer. It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide an insulation layer already surrounding the outer watll of a pumping chamber to provide the insulation over a pumping chamber on an upper wall in order to provide enhanced insulation to a pumping chamber. It has been held that rearranging parts of an invention involves only routine skill in the art. In re Japikse, 86 USPQ 70.

Response to Arguments

11. Applicant's arguments, see page 6-7, filed April 27, 2007, with respect to reference the reference to a "passivation layer" have been fully considered and are persuasive. The objection to the specification has been withdrawn.

12. Applicant's arguments filed April 27, 2007 have been fully considered but they are not persuasive.

13. With regards to the Field reference the applicant argues Field does not teach an inlet or an outlet portion of a pumping chamber that has a cross sectional area that varies along its length. The applicant also argues that the disclosure of the Field et al. reference does not teach a variation of a cross sectional area within a single element, i.e., fluid entrance or fluid exit, as opposed to different cross sectional areas of two potentially adjacent elements. The applicant also argues that the Peeters et al. reference does not supply the teachings noted as missing from the Field et al. reference.

14. In response to applicant's argument that there is no teaching in Field of an inlet or an outlet portion of a pumping chamber that has a cross sectional area that varies along its length the examiner disagrees. Field teaches an outlet with element 14 being in communication with a manifold, element 4, and two discharge ports with element 5. As can be seen in figure 1 elements 5 and 14 are in fluid communication with one another via element 4 and constitute a single outlet passage. Further the cross-sectional area of element 14 varies from that of element 4 in addition to the discharge, element 5, having a cross-sectional area that decreases along a vertical axis and in a direction of fluid flow. With regards to applicant's argument that the disclosure of the Field et al. reference does not teach a variation of a cross sectional area within a single element, i.e., fluid entrance or fluid exit, as opposed to different cross sectional areas of two potentially adjacent elements the examiner disagrees. Elements 14, 4 and 5 are all in fluid communication and viewed as such can be considered as a single outlet structure. Further in response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., a variation of

a cross sectional area within a single element) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

15. With regards to applicant's argument that Peeters et al. reference does not supply the teachings noted as missing from the Field et al. reference; as discussed above the Field reference teaches all the limitations as discussed above and in the office action of January 30, 2007 and the rejection under 35 USC 103(a) is upheld.

Conclusion

16. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Leonard J. Weinstein whose telephone number is 571-272-9961. The examiner can normally be reached on Monday - Thursday 7:00 - 5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Anthony Stashick can be reached on 571-272-4561. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

LJW

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